**Food Industry Management—FIM**

351 Retail Management
Fall, Spring. Summer. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. Administered by Department of Marketing and Supply Chain Management. P: (MSC 300 or MSC 327) R: Open only to juniors or seniors in the Eli Broad College of Business or the Food Industry Management or Merchandising Management major. SA: ML 351, MTA 351

Domestic and international retailing structure, environment, and development. Managerial strategy. Locational, purchasing, organizational, personnel and promotional techniques. Retail budgeting and control. Social and ethical considerations.

400 Public Policy Issues in the Agri-Food System
Spring. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P: (ABM 100) R: Open only to juniors or seniors. SA: FSM 421

Objectives, alternatives and consequences of public policy in the agri-food system. Analysis of economic implications for food and agribusiness firms, farmers, consumers and society.

410 Advanced Professional Seminar in Food Industry Management
Fall. 1(1-0) P: (ABM 210 or FIM 210) R: Open only to Food Industry Management juniors or seniors.

Advanced professional problems and reestablishment of career planning in the agri-food system. Industry trends, career alternatives, and job search strategies. Enhanced verbal, written and visual communication techniques.

422 Vertical Coordination in the Agri-Food System
Fall. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P: (ABM 100 and EC 201) R: Open only to juniors or seniors. SA: FSM 443


427 Global Agri-Food Industries and Markets
Fall. 3(3-0) Interdepartmental with Agribusiness Management. Administered by Department of Agricultural Economics. P: (FIM 220 or ABM 225)

Strategic understanding of the international agri-food system. Analysis of global production, marketing, and consumption. Knowledge of changing conditions in international industries and markets. Global trends and opportunities.

439 Food Business Analysis and Strategic Planning(W)
Fall. 3(3-0) Interdepartmental with Marketing and Supply Chain Management. P: (FIM 220) R: Open only to juniors or seniors. SA: ML 439, MTA 439, MSC 439

Principles and techniques of business analysis and strategic planning applied to food firms. Food trend forecasts, market potential, competition and cost analyses, business and strategic planning.

490 Independent Study in Food Industry Management
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: (ABM 100) R: Open only to sophomores or juniors or seniors in the Food Industry Management major. Approval of department: Application required. Students are limited to a combined total of 6 credits in ABM 490 and FIM 490. SA: FSM 490

Independent supervised study in topics in food industry management.

493 Professional Internship in Food Industry Management
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: (ABM 100) R: Open only to juniors or seniors in the Food Industry Management major. Approval of department: Application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493.

Supervised professional experience in the food industry.

**FOOD SCIENCE—FSC**

**Department of Food Science and Human Nutrition**

**College of Agriculture and Natural Resources**

120 What's for Dinner: Science on Your Plate
Fall, Spring. 1(2-0) Not open to students with credit in FSC 229. Relationship between science and food. Current issues and future challenges in food science. Impact of technology, government, consumers and the media.

150 Introduction to Human Nutrition
Fall, Spring, Summer. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Department of Food Science and Human Nutrition.

Nutrition needs in life stages from a human ecological perspective. Domestic and international factors affecting the availability of a safe, nutritious food supply. Relationships of food choices to health and disease.

211 Principles of Food Science
Fall, Spring. 3(3-0)

Scientific principles, historical perspective, and current status of technology related to food composition, safety, toxicology, processing, preservation, and distribution.

275 Food Safety and Hazard Analysis Critical Control Point Program
Fall. 3(3-0) Independent study. P: (FSC 211 or concurrently or HNF 150 or concurrently or HNF 311 or concurrently or concurrently) or a prior or concurrent basic course in microbiology, chemistry or biological sciences. SA: FSC 442

Sources of microbiological, chemical and physical hazards; minimizing microbial growth and survival; good manufacturing, cleaning and sanitation practices; Hazard Analysis Critical Control Point Programs in food processing and food service.

401 Food Chemistry
Fall. 3(3-0) P: (MBM 200 or CEM 352 or BMB 401) R: Not open to freshmen or sophomores. Organic and biological reactions of food constituents. Chemical changes in foods during processing and storage affecting texture, color, flavor, stability, and nutritive qualities.

402 Food Chemistry Laboratory
Fall. 1(0-3) P: (FSC 401 or concurrently) and completion of Tier I writing requirement. Chemical changes in food constituents which affect stability of food products and properties such as color, flavor and texture.

420 Quality Assurance
Fall. 2(2-0) P: (STT 200 or STT 201 or STT 231 or STT 315 or STT 351) and (FSC 211 or concurrently or ANS 210 or concurrently or HRT 204 or concurrently) R: Open only to juniors or seniors or graduate students in the Department of Food Science and Human Nutrition or in the Food Processing and Technology Specialization. Theory and application of quality assurance programs for food processing industries.
Food Laws and Regulations
Spring. 3(3-0) P. (FSC 150 or HNF 311 or FSC 211 or FIM 100)
Adoption, interpretation, and enforcement of laws and regulations governing food processing and foodservice systems. Impact of regulation on food production, availability, marketing, and safety.

Functional Foods and Human Health
Spring of even years. 3(3-0) P. (FNC 150 or (HNF 311 or concurrently) and (MMG 205 or MMG 301 or FSC 342) and (BMB 200 or concurrently or BMB 401 or concurrently)

Food Processing: Fruits and Vegetables
Fall, 3(2-3) P. (FSC 211) R: Not open to freshmen or sophomores. SA: FSC 330
Fruit and vegetable composition and quality indices. Harvest technology, post-harvest physiology, and preparatory systems. Principles and applications of thermal processing, freezing, and specialized techniques.

Food Processing: Cereals
Spring. 3(2-3) P. (FSC 211) R: Not open to freshmen or sophomores. SA: FSC 331

Food Processing: Dairy Foods
Spring. 3(2-3) P. (FSC 211 or ANS 210) R: Not open to freshmen or sophomores. SA: FSC 332
Principles for production and processing of safe and wholesome dairy foods. Practical experience in safety and quality assurance systems and in the processing of fluid milk, cultured products, cheese, and frozen desserts.

Food Processing: Muscle Foods
Fall. 3(2-3) P. (FSC 211 or ANS 210) R: Not open to freshmen or sophomores. SA: FSC 333
Manufacturing practices and principles of fresh, frozen, and cured meats and fish. Processed products from muscle foods. Egg characteristics. Product formulation and quality control.

Food Microbiology
Spring. 3(3-0) Interdepartmental with Microbiology and Molecular Genetics. P: (MMG 205 or MMG 301) and completion of Tier I writing requirement. R: Not open to freshmen or sophomores. SA: MPH 440
Major groups of microorganisms of importance to the food industry. Emphasis on ecological, physiological, and public health aspects.

Food Microbiology Laboratory
Spring. 2(0-4) Interdepartmental with Microbiology and Molecular Genetics. P: (FSC 440 or concurrently) and completion of Tier I writing requirement. RB: (MMG 206 or MMG 302) SA: MPH 441
Methods for studying major groups of microorganisms important to the food industry. Isolation, enumeration, characterization, identification, and use of microorganisms.

Food Analysis
Fall. 3(2-3) P: (BMB 200) or (BMB 401 or concurrently) and completion of Tier I writing requirement.
Principles and application of analytical techniques. Analysis for fats, proteins, carbohydrates, minerals, vitamins, and additives. Techniques include spectroscopy, fluorimetry, chromatography, electrophoresis, and proximate composition.

Integrated Approaches to Food Product Development
Fall, Spring. 3(2-3) P: (FSC 402 or concurrently or FSC 441 or concurrently or FSC 455 or concurrently) RB: (FSC 325 and BE329) R: Open only to seniors or graduate students.
Food product development including obtaining, screening, and selecting ideas. Integration of food processing, chemistry, analysis, and microbiology for the design, production, and evaluation of a food product.

Food Engineering: Fluids
Fall. 3(2-2) Interdepartmental with Biosystems Engineering. Administered by Department of Agricultural Engineering. P: (BE 350 and BE 351) RB: (CE321 or CHE311 or ME332) SA: FE 465
Unit operations, process engineering, equipment, and industrial practices of the food industry. Manufactured dairy products: thermal processing, pipeline design, heat exchange, evaporation, dehydration, aseptic processing, membrane separation, cleaning, and sanitation.

Special Problems in Food Science
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Not open to freshmen or sophomores. Approval of department; application required.
Individual study of selected topics in food science. Supervised independent study.

Professional Internship in Food Science
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to juniors or seniors in Food Science. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FSC 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493.
Supervised professional experiences in agencies and businesses related to food science.

Chemistry of Food Lipids
Fall of odd years. 3(3-0) RB: (FSC 401 and BMB 461)
Composition and structure of lipids: physical and chemical properties in relation to their function in foods.

Food Proteins
Spring of even years. 3(3-0) RB: (BMB 461 and FSC 401)
Use of proteins and enzymes in the food industry. Functional properties of proteins and enzymes in food systems.

Advanced Food Toxicology
Fall of even years. 3(3-0) Interdepartmental with Animal Science; Human Nutrition and Foods. R: Approval of department.
Toxicology related to food safety. Metabolism of toxicants as influenced by food constituents, mutagenesis, and chemical carcinogenesis. Risk assessment.

Diet and Immune Function
Spring of odd years. 3(3-0) RB: Biochemistry and Microbiology.
Influence of diet on the immune system and relationship to infectious and non-infectious diseases, adverse reactions such as food allergy, and alcohol and substance abuse. Methods to evaluate immune function.

Advanced Cereal Science
Fall of even years. 3(3-0) RB: (BMB 401 and FSC 331 and FSC 401) or approval of department.
Physico-chemical properties of major constituents in cereal grains. Relationship of constituent structures to functionality in the processing of cereal grains into food products, with emphasis on wheat.
### Food Science—FSC

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<tr>
<td>898</td>
<td>Master's Research</td>
<td>Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to master's students in Food Science. Approval of department. Directed research in support of Plan B master's degree requirements.</td>
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<td>899</td>
<td>Master's Thesis Research</td>
<td>Fall, Spring, Summer. 1 to 10 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to M.S. students in Food Science.</td>
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<td>Master's thesis research.</td>
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<td>999</td>
<td>Doctoral Dissertation Research</td>
<td>Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to Ph.D. students in Food Science.</td>
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<td>101</td>
<td>Michigan's Forests</td>
<td>Spring. 3(3-0) Ecological, social and economic roles of Michigan's forests in historic and contemporary context. Geographic similarities and differences in forest resources.</td>
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<td>201</td>
<td>Foundations of Forestry</td>
<td>Fall. 2(2-0) R: Open only to students in the Department of Forestry. History, founding principles, and core concepts of forestry. Stewardship, conservation, professional ethics, and current forestry issues.</td>
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<td>202</td>
<td>Introduction to Forestry</td>
<td>Fall, Spring. 3(3-0) Historical development of forestry. Forest growth, protection, management, and products. Relationship of national and world economy and policy to forestry. Emphasis on multiple uses of forests.</td>
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<td>204</td>
<td>Forest Vegetation</td>
<td>Fall. 4(3-3) Nomenclature, classification, and identification of woody plants. Tree structure as it relates to growth and ecosystem dynamics.</td>
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<td>211</td>
<td>Introduction to Gender and Environmental Issues</td>
<td>Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife; Environmental Economics and Policy; Resource Development Women's Studies. Administered by Department of Fisheries and Wildlife. R: Not open to freshmen; SA: PRM 211 The concept of gender. Overview of environment and habitat. Historical gender roles in environmental management. Gender-based theoretical perspectives. Case studies on developing and developed countries. Environmental management with emphasis on fisheries, wildlife and wetlands. Women environmental professionals.</td>
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<td>220</td>
<td>Forests and the Global Environment</td>
<td>Fall. 3(3-0) Relationships between forests, climatic and edaphic factors, and human influences upon forest resources. Deforestation, biodiversity, sustainable forest management and timber trade.</td>
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<td>304</td>
<td>Wood Technology</td>
<td>Fall. 4(3-2) P: (CEM 141 and PHY 231) and (MTH 116 or MTH 104 or LBS 117) R: Not open to freshmen or sophomores. Structure and identification of wood. Physical and mechanical characteristics. Major industrial timber utilization processes including manufacture of lumber, furniture, composites, and paper.</td>
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### FORENSIC SCIENCE FRS

**School of Criminal Justice College of Social Science**

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<td>809</td>
<td>Issues in Forensic Science</td>
<td>Fall, Spring. 2 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. Forensic science research, practice and legal processes.</td>
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<td>890</td>
<td>Independent Study</td>
<td>Fall, Spring. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Individual research and writing under faculty supervision.</td>
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<td>894</td>
<td>Practicum</td>
<td>Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Observation, study, and work in selected forensic science agencies.</td>
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